A Pygmy Rabbit (*Brachylagus idahoensis*) Survey

Idaho Bureau of Land Management Public Lands
Burley Field Office Area

Photograph courtesy of Michael Wolfe, Ph D., Utah State University

Bureau of Land Management
Burley Field Office Area
15 East 200 South
Burley, Idaho 83318

Christopher White, Wildlife Technician
Peggy Bartels, Wildlife Biologist

December 4, 2002

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Abstract

Wildlife biologists have become increasingly concerned about the pygmy rabbit (*Brachylagus idahoensis*) population found in the western United States. Therefore, a formal survey of BLM land was conducted from 9 September through 18 November, 2002 to determine the status of pygmy rabbits within the Burley Field Office Area, Idaho. We conducted surveys within 11 grazing allotments and walked approximately 170 total miles. We found a total of 35 burrows and revisited 24 burrows with the peeper probe. Of these 24 burrows we classified 6 burrow systems as occupied by pygmy rabbits on two grazing allotments and classified 16 pygmy rabbit burrows as inactive on two other grazing allotments. Pygmy rabbit habitat has not been evaluated in south-central Idaho. Sagebrush canopy cover of occupied burrows averaged 34.75%. Sagebrush height averaged 94.68 cm around the occupied burrows. Thirty-one historical locations were visited, 18 of these were vague locations and could not be properly located, 8 of these were disturbed due to agricultural development, urban development, and wildfire and reseeding efforts, and 5 of these were potentially suitable pygmy rabbit habitat.

A Pygmy Rabbit (*Brachylagus idahoensis*) Survey on Bureau of Land Management Public Lands Within the Burley Field Office Area

Chris White, B.S.
Wildlife Technician

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Wildlife Biologist

Burley Bureau of Land Management Field Office Area
December 4, 2002

INTRODUCTION

Wildlife biologists have become increasingly concerned about the pygmy rabbit (*Brachylagus idahoensis*) population found in the western United States. The Bureau of Land Management (BLM) wildlife biologists in the Burley, Idaho Field Office Area (FOA) were concerned due to lack of recent pygmy rabbit observations within the FOA. Previous Burley BLM biologists had not observed a pygmy rabbit during the past ten years within the Burley FOA (Augsberger personal communication). Therefore, a formal survey of BLM land was necessary to determine the status of pygmy rabbits within the Burley FOA.

STUDY AREA

Our study area was focused in the Shoshone Basin, Raft River Valley, and South Hills of the Burley FOA. The Shoshone Basin is located in the southeastern portion of Twin Falls County. This landscape includes rolling hills, basins, rocky ridges and canyons. Salmon Falls Creek borders the area to the west, the Sawtooth National Forest to the east, the Nevada state line to the south, and a small ridge of hills on the north. The Raft River Valley is a smaller north-south watershed of the larger Snake River Watershed and is located in Cassia County. The Raft River marks a natural corridor from the Great Basin to the Columbia Basin. This river begins near the Utah border, near the City of Rocks National Reserve and flows counterclockwise around the volcanic Jim Sage Mountains. It then flows north to join with the Snake River. The South Hills are located on the southern edge of the Snake River plain, south of the cities of Burley and Twin Falls in Cassia County.

Within our study area shallow, rocky soils predominated on ridges and the higher elevations, whereas deeper soils were more abundant in the lower elevation drainage systems. The majority of our survey sites were located on alluvial fans.

The soils of the Raft River drainage were increasingly alkaline in the flat, lower elevation sites. Big sagebrush (*Artemisia tridentate*) and blue bunch wheat grass (*Agropyron spp.*) dominated on deeper soils. Black (*Artemisia nova*) and low sagebrush (*Artemisia arbuscula*) occurred on shallower soils and rocky ridges.

METHODOLOGY

Limited habitat and vegetation data is available within the Burley FOA, therefore we were unable to use a model to increase probability of locating pygmy rabbit habitat. We focused our study area initially by selecting grazing allotments on which mature, healthy sagebrush remained and therefore, contained the best possible pygmy rabbit habitat. A combination of thick, dense sagebrush and soft, deep soils are required for pygmy rabbit to inhabit a site (Gahr 1993, Wilde 1978, Green and Flinders 1980a). In addition, we selected grazing allotments that were documented historical locations of pygmy rabbits. We ranked these allotments in order of greatest probability of containing suitable pygmy rabbit habitat. We primarily conducted surveys within native vegetation of each grazing allotment.

We selected the following allotments within the Burley FOA on which to conduct a pygmy rabbit survey (Maps 1, 2, and 3).

Raft River Valley Area

- South Jim Sage allotment
- Clear Creek allotment
- Strevell allotment

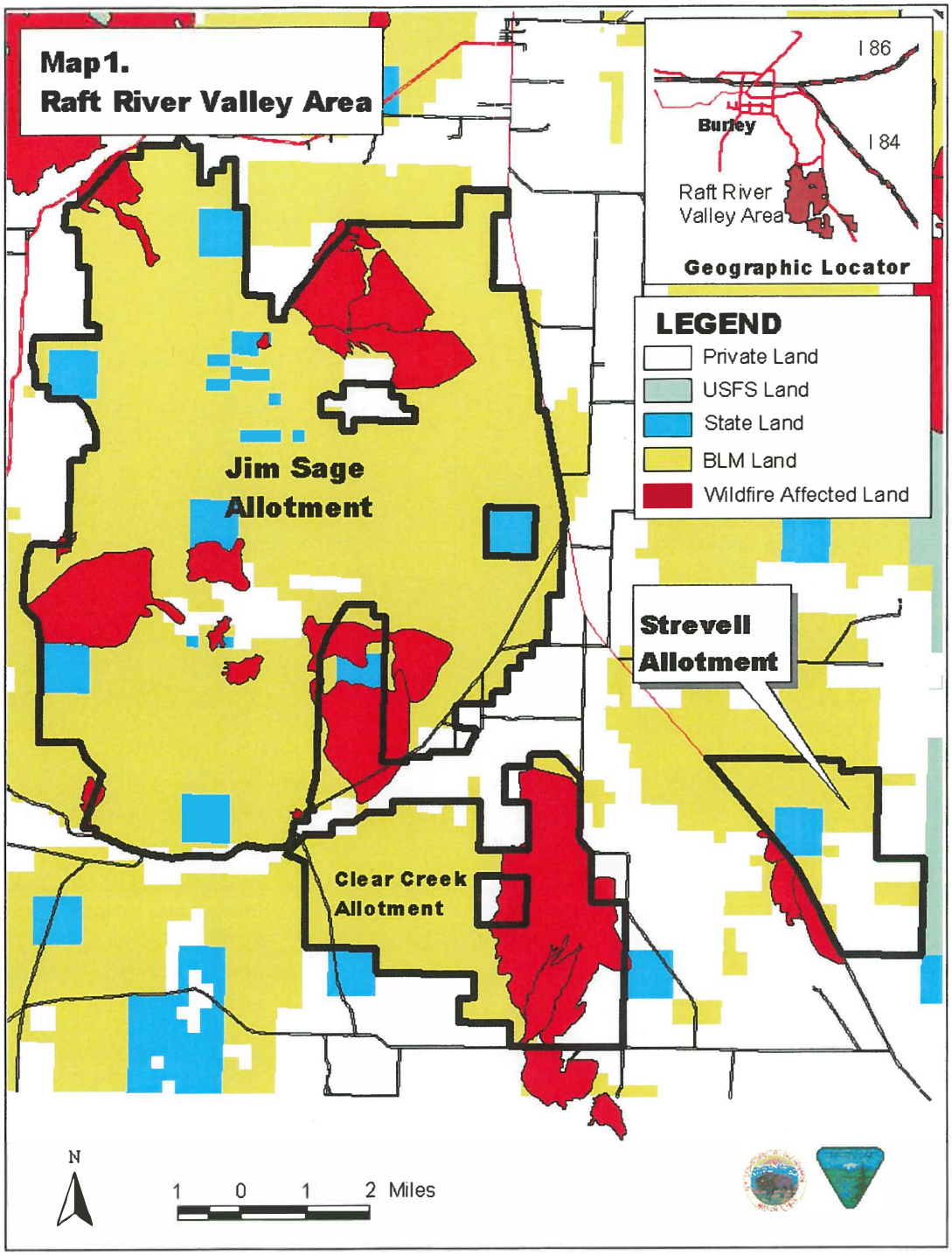
Shoshone Basin Area

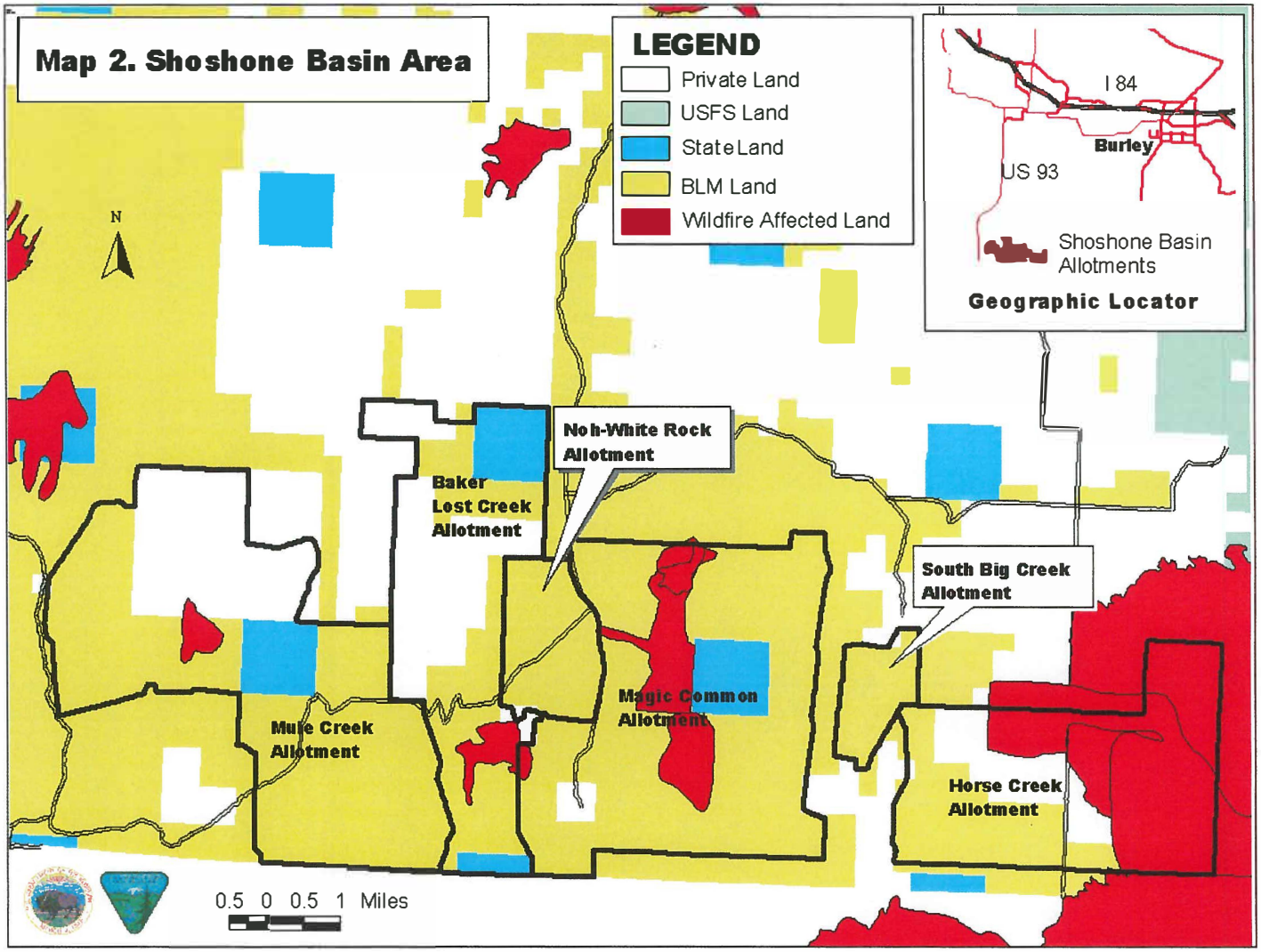
- Mule Creek allotment
- Baker Lost Creek allotment
- Magic Common allotment
- South Big Creek allotment
- Horse Creek allotment
- Noh White Rock allotment
- Shoshone Creek allotment

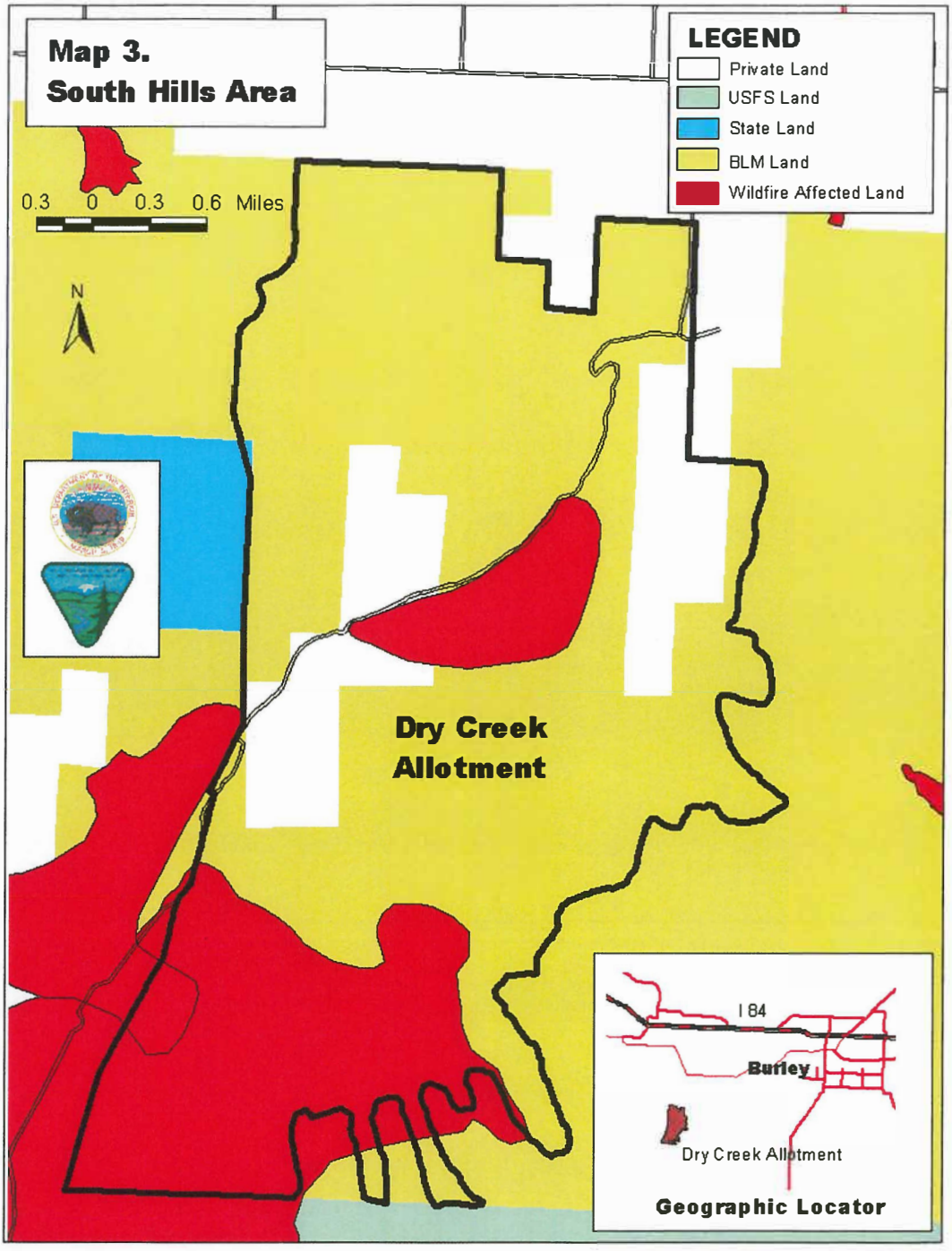
South Hills Area

- Dry Creek allotment

We used 1:100,000 BLM surface management status maps to locate the selected allotment and to navigate to the allotment in the field. Upon reaching the selected allotment, we used 1:24,000 United States Geological Survey (USGS) topographic maps to navigate within the allotment.


Map 1.
Raft River Valley Area
I 86
Burley
I 84
Raft River
Valley Area
Geographic Locator
LEGEND
Private Land
USFS Land
State Land
BLM Land
Wildfire Affected Land
Jim Sage
Allotment
Strevell
Allotment
Clear Creek
Allotment
N
1 0 1 2 Miles


Map 2. Shoshone Basin Area
LEGEND
Private Land
USFS Land
State Land
BLM Land
Wildfire Affected Land
I 84
Burley
US 93
Shoshone Basin Allotments
Geographic Locator
N
Noh-White Rock Allotment
Baker Lost Creek Allotment
South Big Creek Allotment
Magic Common Allotment
Mule Creek Allotment
Horse Creek Allotment
0.5 0 0.5 1 Miles


Map 3.
South Hills Area
LEGEND
Private Land
USFS Land
State Land
BLM Land
Wildfire Affected Land
0.3 0 0.3 0.6 Miles
N
Dry Creek
Allotment
I 84
Burley
Dry Creek Allotment
Geographic Locator

The first phase of the survey consisted of reviewing aerial orthophotos. We narrowed our survey to focus on the darker gray areas of the aerial photos. These gray areas correlated with dense sagebrush stands and therefore represented suitable pygmy rabbit habitat. In the next phase of the survey, we drove the navigable roads within the selected allotments to search for suitable pygmy rabbit habitat. We then located large areas of suitable habitat of healthy sage with habitat attributes of big sage inclusions or low sage/big sage habitat interfaces. Next we performed foot searches of this suitable habitat and used a Global Positioning Satellite (GPS) unit Geo Explorer III (Trimble) to record our routes and the burrow data points along the route.

During the second phase of our search, we downloaded the GPS route and burrow data points into Geographical Information System (GIS) Pathfinder Software (Trimble) and transferred the data into Arc view GIS software (ESRI). We produced maps with coverage layers over 1:24,000 USGS digital orthophoto quadrangles that contained our GPS routes and data points. The resulting maps illustrated our foot search routes and burrow data points for each day within each allotment. We then attached these maps to our wildlife observation data forms.

Wildlife Observation Data Forms

We created and developed a wildlife observation data form to record pertinent data during our search (Appendix 1). We used the following definitions to describe pygmy rabbit sign and burrows:

- Typical burrow — burrow entrance three to four inches in diameter, slightly oblong, pathway present, open burrow entrance
- Atypical burrow — burrow entrance six to ten inches in diameter, excavated by an animal such as a badger
- Fresh pellets — pellets dark black in color, soft consistency, and containing sufficient moisture to indicate that they have been deposited within the past month
- Old pellets — lack moisture and have a white, light brown, or tan color
- Burrow — one surface entrance
- Burrow system — one or more surface entrances that are connected by underground tunnels

Appendix 1. Wildlife Observation Form

Observers: Chris White, Peggy Bartels Date: _____

Affiliation: Bureau Of Land Management

Address: 50 E.200 S. Burley, ID. 83318 Phone:(208) 677-6618

Target species name: *Brachylagus idahoensis* (Pygmy rabbit) Target species code: BRID

Site name: _____ Sequence number: _____

Township: _____ Range: _____ Section: _____ Quarter: _____

UTM: Zone: 12 N 11 N NAD: 27 conus Northing:_____

Easting: _____

Is this observation known to be a new occurrence?: Yes_____ No_____

Quad map name:_____ Survey method: Peeper probe Route Burrow data point

Activity search time: Start:_____ Stop:_____

ATTACH TOPOGRAPHIC MAP WITH LOCATION MAPPED

Wildlife species observed:

Target species/sign observed/heard (Y/N):_____

Species	**Spp Code**	**Adult # M/F/J/U**	**Young of Year # M/F/J**	**Time of Detection**	**Sign Code**
_____	_____	___/___/___/___	___/___/___	_____	_____
_____	_____	___/___/___/___	___/___/___	_____	_____
_____	_____	___/___/___/___	___/___/___	_____	_____
_____	_____	___/___/___/___	___/___/___	_____	_____
_____	_____	___/___/___/___	___/___/___	_____	_____

Sign codes: Carcass=ca whitewash=wa scat=st pellet=pl skin=sk feather=fe hair=ha tracks=tr bu=burrow ob=observation (separate multiple sign codes with a "/")

For use with peeper probe

BURROW STATUS: Occupied____ Not occupied____ Not checked____ Not found____

Found:____ Nest structure gone____ Nest gone____

NEST CONDITION: Fresh materials____ Fresh pellets____ Old pellets____

Nest aspect____ Nest slope____ Soil type____ Range site____

Peeper probe comments:_____

_____

_____

Burrow flow chart

Open burrow +

Small pellets + Typical burrow + Fresh pellets (Active) = GPS and record data & peeper probe

Small pellets + Typical burrow + Old pellets (Inactive) = GPS and record data & peeper probe

Small pellets + Atypical burrow + Fresh pellets (Active) = GPS and record data & peeper probe

Small pellets + Atypical burrow + Old pellets (Inactive) = GPS and record data

No pellets + Typical burrow = GPS and record data

No pellets + Atypical burrow = No record required

Burrow Codes:

Active burrow = fresh, dark pellets
Inactive burrow = old, white pellets
Open burrow = not collapsed, usable physical entrance
Typical burrow = under sagebrush, fist size, multiple entrance points

Comments:_____

_____

_____

_____

Site description/directions:_____

_____

• Active burrow	fresh, small pellets present in piles at the opening of a burrow entrance or within a three-foot radius from the burrow entrance, at least one burrow signature, but may be inhabited by cottontails
• Inactive burrow	lacks fresh pellets within the immediate vicinity, at least one burrow signature
• Occupied burrow	many fresh pellets present in pellet piles, burrows constructed by pygmy rabbits based on two burrow signatures
• Unoccupied burrow	scattered, old pellets present, burrows constructed by pygmy rabbits based on at least one or two burrow signatures present
• Undetermined occupancy	fresh pellets present, but unable to determine if occupancy is cottontail or pygmy rabbit and no burrow signatures present, therefore unable to determine if burrow was constructed by a pygmy rabbit

We developed a burrow flow chart that was used in the field to objectively decide which burrows were of interest to review internal structure with a peeper probe Video System (Sandpiper Technology) (Appendix 1). Once a burrow was classified, within an appropriate flow chart description, a GPS coordinate was recorded and marked on the wildlife observation form for a return visit and review with the peeper probe. Generally, any burrows with fresh pellets were reviewed with the peeper probe.

We later returned to these GPS coordinates to classify the burrow data points for field review with the peeper probe to determine if each burrow was (1) occupied by pygmy rabbits, (2) unoccupied by pygmy rabbits, or (3) undetermined occupancy. We obtained photographs of active burrows and documented the burrow status. We also noted the presence or absence of fresh pellets, the burrow aspect, and the slope.

Using a peeper probe, we viewed the internal structure of burrows. Burrow signatures were determined by use of the peeper probe. Two major attributes of the internal structure of a pygmy rabbit burrow can be identified with a peeper probe: (1) a 35-degree angle to 45-degree angle tunnel and (2) a 90-degree angle tunnel bifurcation that dead-ends. Observing the initial internal structure of a pygmy rabbit burrow, there is a cavity that is shaped like an oval on its side. Leading from this cavity are two or more 35 - 45-degree angle bifurcating tunnels. All tunnels lead either to the surface or to a dead end. Along a tunnel that surfaces to the ground, there is a tunnel that bifurcates to a dead end tunnel.

These dead end tunnels bifurcate at 90 degrees. Dead end tunnels are not typically well used and may represent a natal burrow.

Habitat

We measured the average height and percent sagebrush canopy cover at the occupied pygmy rabbit burrows. These measurements were obtained by extending a fifty-foot measuring tape from occupied burrows in the four cardinal directions. Two vegetation classifications were recorded: (1) sagebrush canopy cover verses other cover and (2) sagebrush height. We were primarily concerned with the sagebrush canopy cover and the height of sagebrush within 50-feet of an active burrow. The number of inches classified as "sagebrush canopy cover" was divided by the total inches measured, resulting in the percent canopy cover of sagebrush. The height of each sagebrush bush along the axis of measurement was also recorded and the average sagebrush height was calculated.

Historical Locations

In addition to conducting a pygmy rabbit survey of suitable habitat, we compiled historical location data for the Burley FOA and visited these sites to document the presence or absence of remaining suitable pygmy rabbit habitat. We obtained historical locations of pygmy rabbits in the Burley FOA from the following institutions: The Smithsonian Institute, Idaho Conservation Data Center, San Diego Natural History Museum, Utah Museum of Natural History, and the Natural History Museum of Los Angeles County. We also used general historical location data (Conde 1982).

RESULTS

Survey

We conducted this survey from 9 September through 18 November, 2002. We spent approximately 540 hours planning, surveying, compiling data, and writing this technical report. We spent 90 hours planning and compiling data, 190 hours foot searching the allotments, 40 hours driving, 85 hours searching for adequate pygmy rabbit habitat within the selected grazing allotments, 15 hours visiting historical pygmy rabbit locations, and 120 hours compiling and analyzing data and writing this report. During our foot search, we walked approximately 170 total miles. We found a total of 35 burrows and revisited 24 burrows with the peeper probe. Of these 24 burrows we classified 6 burrow systems as occupied by pygmy rabbits (Table 1).

Table 1. Allotment Data Summary

Allotments	Acres	Miles Searched	Vegetation Type	Burrows Found	Burrows Peeper probed	Pygmy Rabbits Observed	Occupied Pygmy Rabbit Burrows	Inactive Pygmy Rabbit Burrows
Strevell	6065	30	native	15	15	0	0	15
Clear Creek	15143	30	native	11	2	0	0	0
Jim Sage	70079	30	native	2	1	0	0	0
Mule Creek	10130	20	native	3	2	0	3	0
Baker Lost Creek	6104	10	seeding (1966)	0	0	0	0	0
Magic Commons	9315	14	native	0	0	0	0	0
Horse Creek	6357	10	native	3	3	0	3	0
Shoshone Creek	1066	5	native	0	0	0	0	0
Dry Creek	7760	15	native	1	1	0	0	1
S. Big Creek	886	2	native	0	0	0	0	0
Noh-White Rock	162	4	seeding (1966)	0	0	0	0	0
Total	133067	170		35	24	0	6	16

Within the 6,065 acres of the Strevell allotment, sections of native vegetation remained. We foot searched approximately 30 miles. We found a total of 15 burrows within this allotment. We revisited these 15 burrow systems with the peeper probe and determined that these burrows contained one burrow signature. We classified these 15 burrows as unoccupied. We did not observe pygmy rabbits within this allotment.

Within the 15,143 acres of the Clear Creek allotment, sections of native vegetation remained. We foot searched approximately 30 miles. We found a total of 11 burrows within this allotment. We revisited 2 of these burrow systems with the peeper probe, but found only undetermined occupancy of these burrow systems. While the entrances of these nine burrow systems were open, when viewed internally with the peeper probe, we found that they were collapsed. We did not observe pygmy rabbits on this allotment.

Within the 70,079 acres of the Jim Sage allotment, sections of native vegetation remained. We foot searched approximately 30 miles. We found a total of 2 burrow systems within this allotment. We revisited one burrow system with the peeper probe and classified it as an atypical burrow system. We were unable to determine any pygmy rabbit burrow signatures. We found the other burrow system was collapsed. We did not observe pygmy rabbits on this allotment.

Within the 10,130 acres of the Mule Creek allotment, sections of native vegetation remained. We foot searched approximately 20 miles within this allotment. We found a total of 3 burrow systems. We revisited 2 of these burrow systems with the peeper probe and classified both burrows as occupied. During our return visit, we found an additional burrow system and also classified it as occupied, resulting in a total of 3 burrow systems classified as occupied by pygmy rabbits within this grazing allotment. We did not observe pygmy rabbits within this allotment.

Within the 6,104 acres of the Baker Lost Creek allotment, the vegetation was primarily seeded crested wheat grass with some areas of dense sagebrush. We foot searched approximately 10 miles. We did not find any burrows within this allotment, nor did we observe pygmy rabbits within this allotment.

Within the 9,315 acres of the Magic Commons allotment, sections of native vegetation remained. We foot searched approximately 14 miles. We did not find any burrows within this allotment nor did we observe any pygmy rabbits.

Within the 6,357 acres of the Horse Creek allotment, sections of native vegetation remained. We foot searched approximately 10 miles of this grazing allotment. We found a total of 3 burrow systems. We revisited 3 of these burrow systems with the peeper probe and classified 3 burrow systems as occupied by pygmy rabbits. We did not observe pygmy rabbits within this allotment.

Within the 1,066 acres of the Shoshone Creek allotment, sections of native vegetation remained. We foot searched approximately 5 miles. We did not find any burrows nor observe any pygmy rabbits on this grazing allotment.

Within the 7,760 acres of the Dry Creek allotment, sections of native vegetation remained. We foot searched approximately 15 miles. We found 1 burrow system within this grazing allotment. We revisited this burrow system with the peeper probe and classified it as constructed by pygmy rabbits, but currently inactive. We did not observe pygmy rabbits on this grazing allotment.

Within the 886 acres of the South Big Creek allotment, sections of native vegetation remained. We foot searched approximately 2 miles. We did not find any burrows or observe any pygmy rabbits on this grazing allotment.

Within the 162 acres of the Noh-White Rock allotment the vegetation was primarily crested wheat grass with small areas of dense sagebrush. We foot searched approximately 4 miles. We did not find any burrows nor did we observe any pygmy rabbits on this grazing allotment.

Historical Locations

There were a total of 31 historical locations within the Burley FOA (Map 4, Table 2). Due to the lack of accurate, site specific historical information for 18 of these 31 historical sites, we were unable to document the absence or presence of pygmy rabbits or determine remaining suitable pygmy rabbit habitat at these sites. We visited the remaining 13 of 31 historical locations within the Burley FOA that were based on accurate location data and obtained photographs to document the presence or absence of suitable habitat at each site. These photographs are on file in the Burley BLM Field Office.

Of the 13 historical locations that we visited, we found no active pygmy rabbit burrows. Suitable pygmy rabbit habitat was observed on 5 of these 13 historical locations (Table 2). Sites with remaining suitable pygmy rabbit habitat included:

- Rattlesnake Butte
- Naf
- Black Pine Peak
- Black Pine
- Nibbs Creek

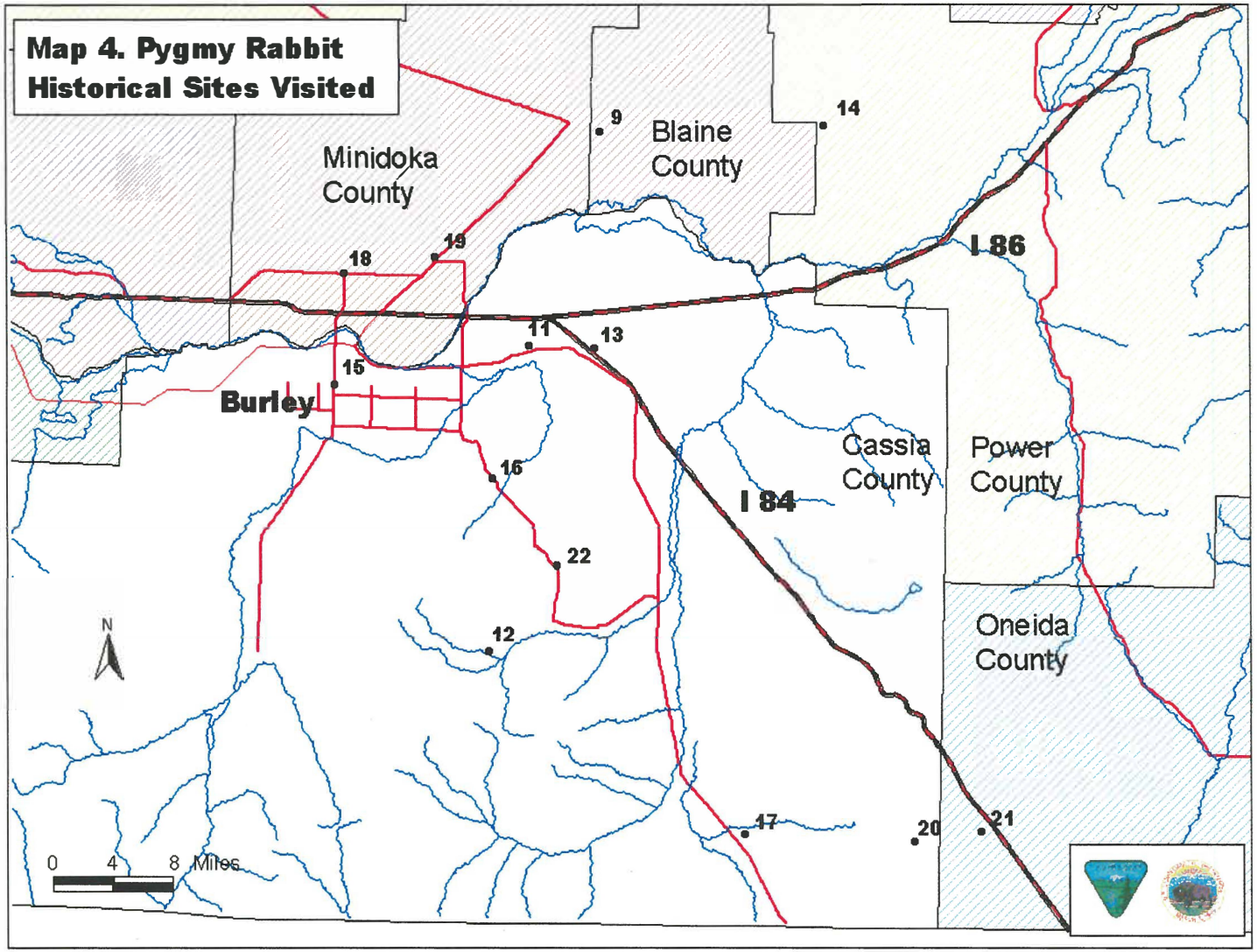

Map 4. Pygmy Rabbit
Historical Sites Visited
Minidoka
County
Blaine
County
Cassia
County
Power
County
Oneida
County
Burley
I 86
I 84
9
14
18
19
11
13
15
16
22
12
17
20
21
N
0 4 8 Miles

Table 2. Pygmy Rabbit Historical Locations

ID	Town, Range, Section	Zone	Easting	Northing	Latitude	Longitude	USGS Quad	Site status
1	012S 025E	12 N					Albion	
2	012S 025E	12 N					Albion	
3	012S 025E	12 N					Albion	
4	008S 025E	12 N					Minidoka	
5	008S 025E	12 N					Minidoka	
6	008S 025E	12 N					Minidoka	
7	008S 025E	12 N					Minidoka	
8	008S 025E	12 N					Malta	
9	008S 026E Sec 6	12 N	298753	4735555	424453N	1132732W	Lake Walcott W	disturbed/agriculture
10	015S 026E	12 N					Chokecherry Canyon	
11	011S 025E Sec 31	12 N	287397	4699030	422459N	1133502W	Albion	disturbed/seeding
12	013S 025E Sec 31	12 N	286906	4680613	421502N	1133459W	Connor Ridge	disturbed/agriculture
13	010S 026E Sec 19	12 N	298154	4712634	423230N	1132729W	Lake Walcott SW	disturbed/seeding
14	008S 028E Sec 3	12 N	322588	4736136	424533N	1131005W	Rattlesnake Butte	possible habitat
15	011S 023E Sec 5	12 N	270582	4708857	423000N	1134731W	Burley SE	disturbed/urban
16	010S 025E Sec 21	12 N	291265	4712837	423230N	1133231W	Rupert SE	disturbed/agriculture
17	015S 027E Sec 25	12 N	313894	4661296	420501N	1131500W	Naf	possible habitat
18	009S 023E Sec 29	12 N	271631	4720588	423621N	1134702W	Burley SE	disturbed/urban
19	009S 024E Sec 21	12 N	281290	4722345	423728N	1134001W	Rupert SW	disturbed/urban
20	015S 029E Sec 35	12 N	331993	4660534	420451N	1130152W	Black Pine Peak	possible habitat
21	015S 030E Sec 28	12 N	339051	4661542	420529N	1125646W	Black Pine	possible habitat
22	012S 025E Sec 35	12 N	294190	4689657	422002N	1132953W	Nibbs Creek	possible habitat
23	010S 023E	12 N					Burley SE	
24	010S 023E	12 N					Burley SE	
25	010S 023E	12 N					Burley SE	
26	009S 024E	12 N					Rupert	
27		12 N					Nibbs Creek	
28		12 N					Nibbs Creek	
29		12 N					Nibbs Creek	
30	009S 023E	12 N					Burley SE	
31	009S 023E	12 N					Burley SE	

Eight of these 13 historical locations were disturbed due to agricultural and urban development and wildfire reseedings including (Table 2):

- Lake Walcott West
- Albion
- Lake Walcott SW
- Burley SE (two locations)
- Rupert SE
- Burley SE
- Rupert SW

Habitat Description

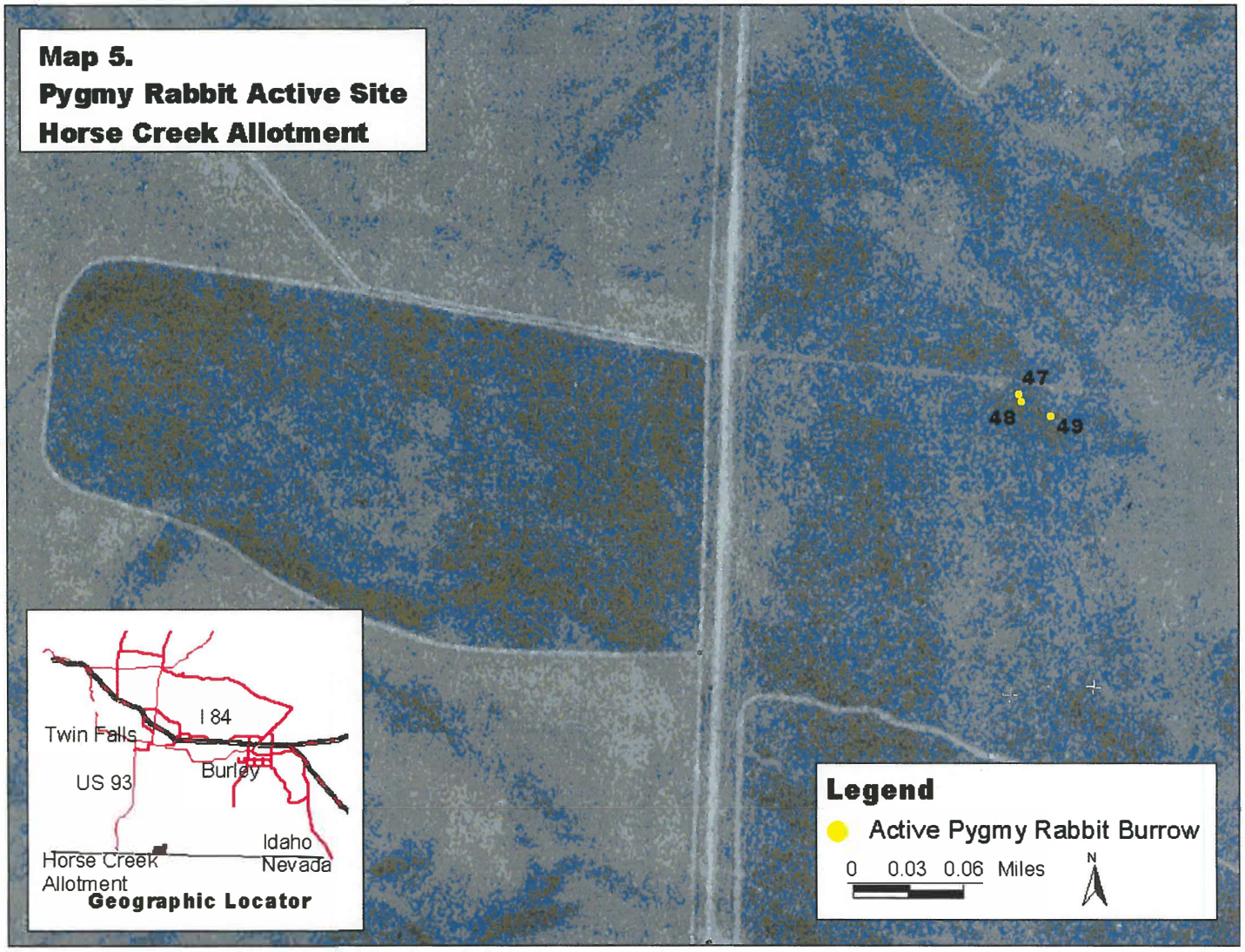
Pygmy rabbit habitat has not been described in South-Central Idaho. We recorded some initial measurements at the six occupied burrow systems located on the Mule Creek and Horse Creek allotments (Maps 5 and 6). On the Mule Creek allotment, 35.96% sagebrush canopy cover with an average sagebrush height of 110.62 cm surrounded occupied pygmy rabbit burrows. On the Horse Creek allotment, 33.54% sagebrush canopy cover with an average sagebrush height of 78.74 cm surrounded occupied pygmy rabbit burrows.

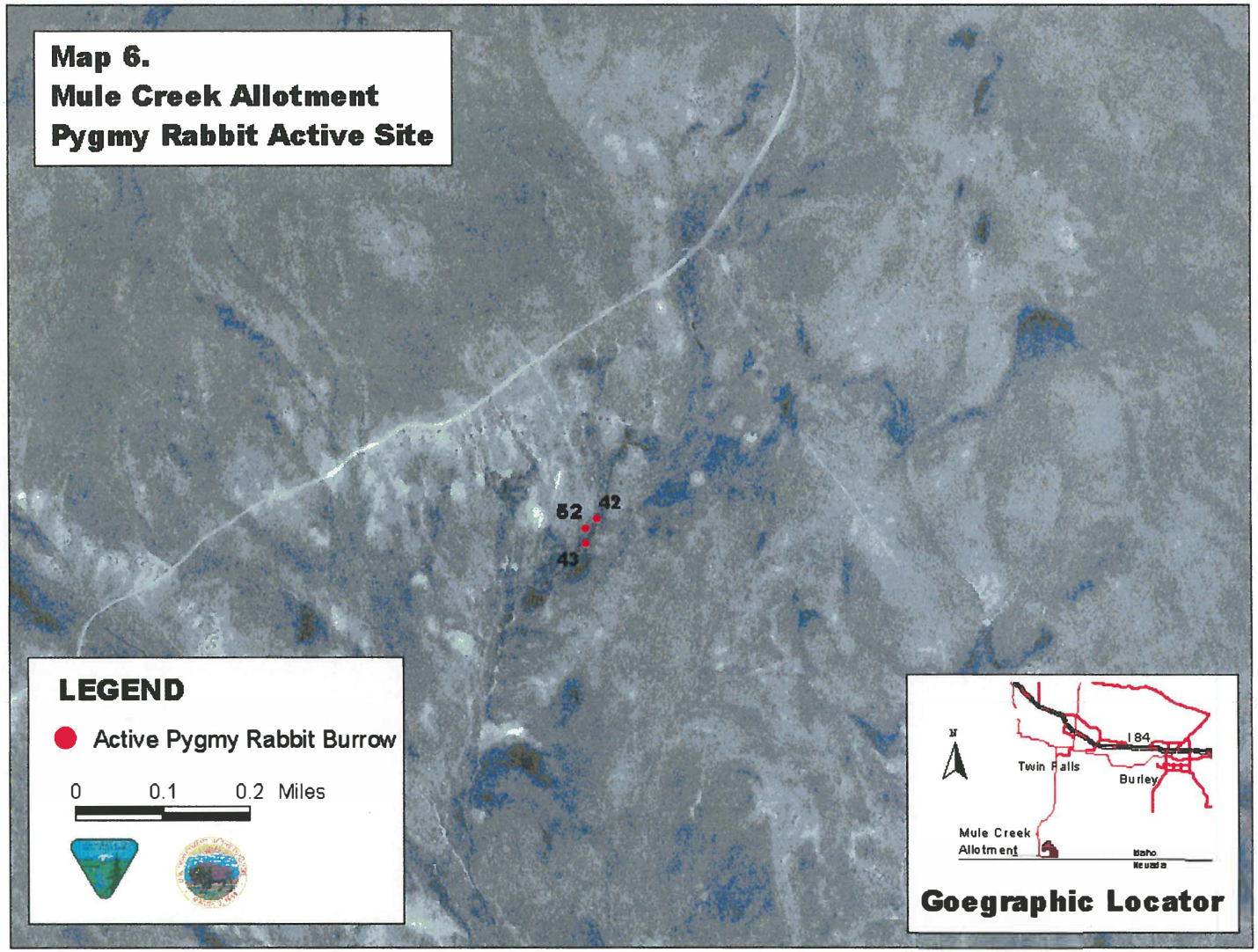
DISCUSSION

We conducted a pygmy rabbit search on eleven allotments totaling 133,067 acres (Maps 1, 2, and 3). We located six occupied burrow systems. Three of these burrows systems were located within the Mule creek allotment and three were located within the Horse Creek allotment.

We located fifteen burrows on the Strevell allotment and one burrow on the Dry Creek allotment and while these burrows were determined to be constructed by pygmy rabbits, they had been occupied in the recent past, but were currently unoccupied. In addition, a Burley BLM staff member photographed a pygmy rabbit on the Dry Creek site during 2002 (on file in the Burley FOA).

We also located eleven burrows within the Clear Creek and two burrows within the Jim Sage allotment. Fresh, small pellets were found within a 3-foot radius of these burrows, but pygmy rabbits did not construct these burrows. Cottontails may be using these burrows. We will continue to monitor these sites bi-annually for pygmy rabbits and signs of activity by pygmy rabbits.


Map 5.
Pygmy Rabbit Active Site
Horse Creek Allotment
47
48
49
I 84
Twin Falls
US 93
Burley
Idaho
Nevada
Horse Creek
Allotment
Geographic Locator
Legend
Active Pygmy Rabbit Burrow
0 0.03 0.06 Miles
N


Map 6.
Mule Creek Allotment
Pygmy Rabbit Active Site
52
42
43
LEGEND
Active Pygmy Rabbit Burrow
0
0.1
0.2 Miles
N
184
Twin Falls
Burley
Mule Creek
Allotment
Idaho
Nevada
Goegraphic Locator

We were unable to determine accurate geographical locations for 18 of the 31 historical locations. We were able to determine accurate geographical locations for 13 of the 31 historical locations. Eight of these 13 historical sites visited were disturbed and unsuitable pygmy rabbit habitat. The major disturbances within the Burley FOA included agricultural and rural development.

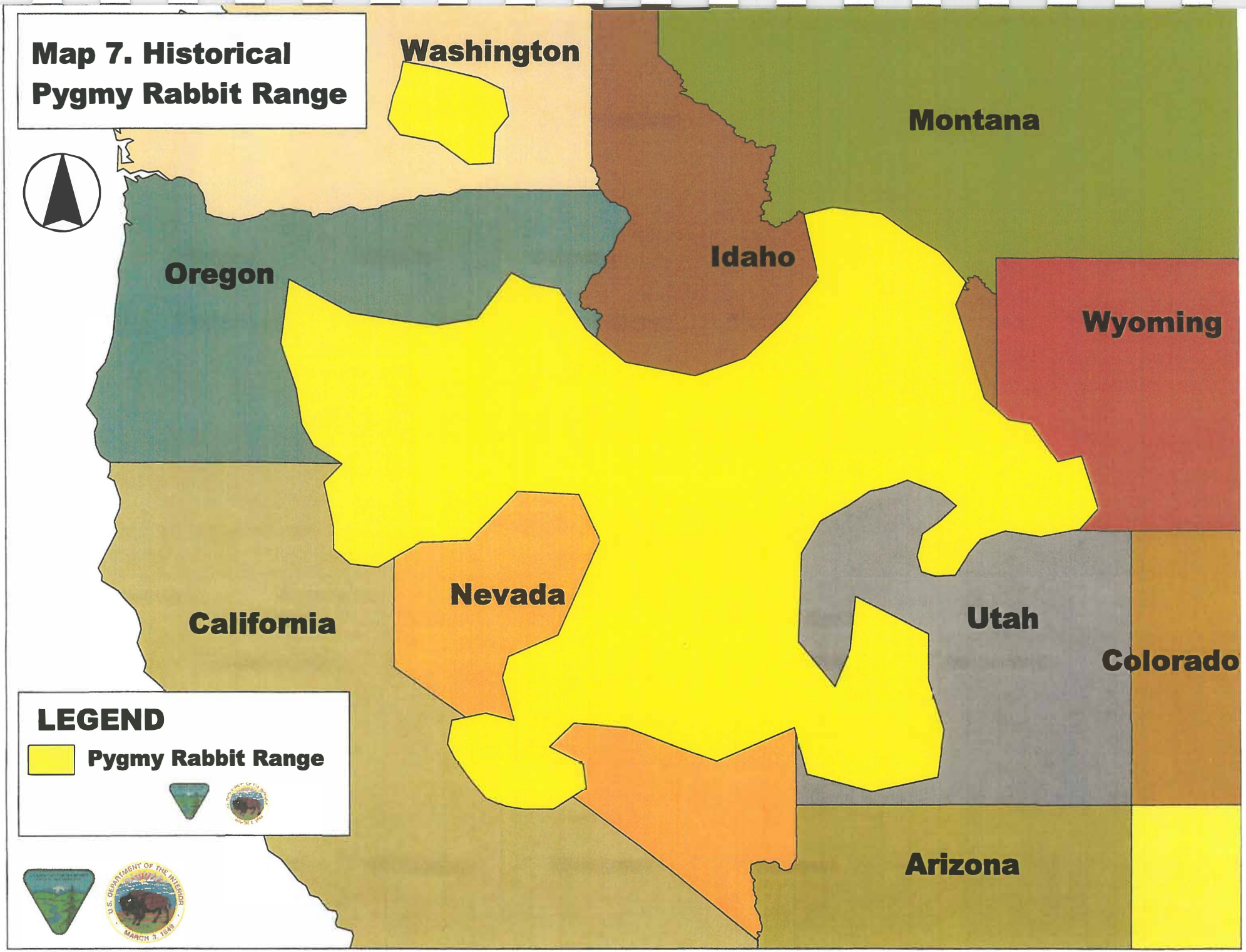
While agricultural development within the Snake River Plain has been the major factor in the destruction of pygmy rabbit habitat and decline of populations in Idaho, we also believe that wildfire has also been a major factor contributing to the low number of active pygmy rabbit burrows found within the Burley FOA. Of the 133,067 total acres surveyed, 23,660 of these acres were affected by wildfire within the past fifteen years. In addition, during 1966, a wildfire burned the entire Shoshone Basin. Pygmy rabbits are sagebrush obligate species and require late succession sagebrush stands for survival. This species is unable to re-colonize suitable habitat when large acreages are affected by wildfire.

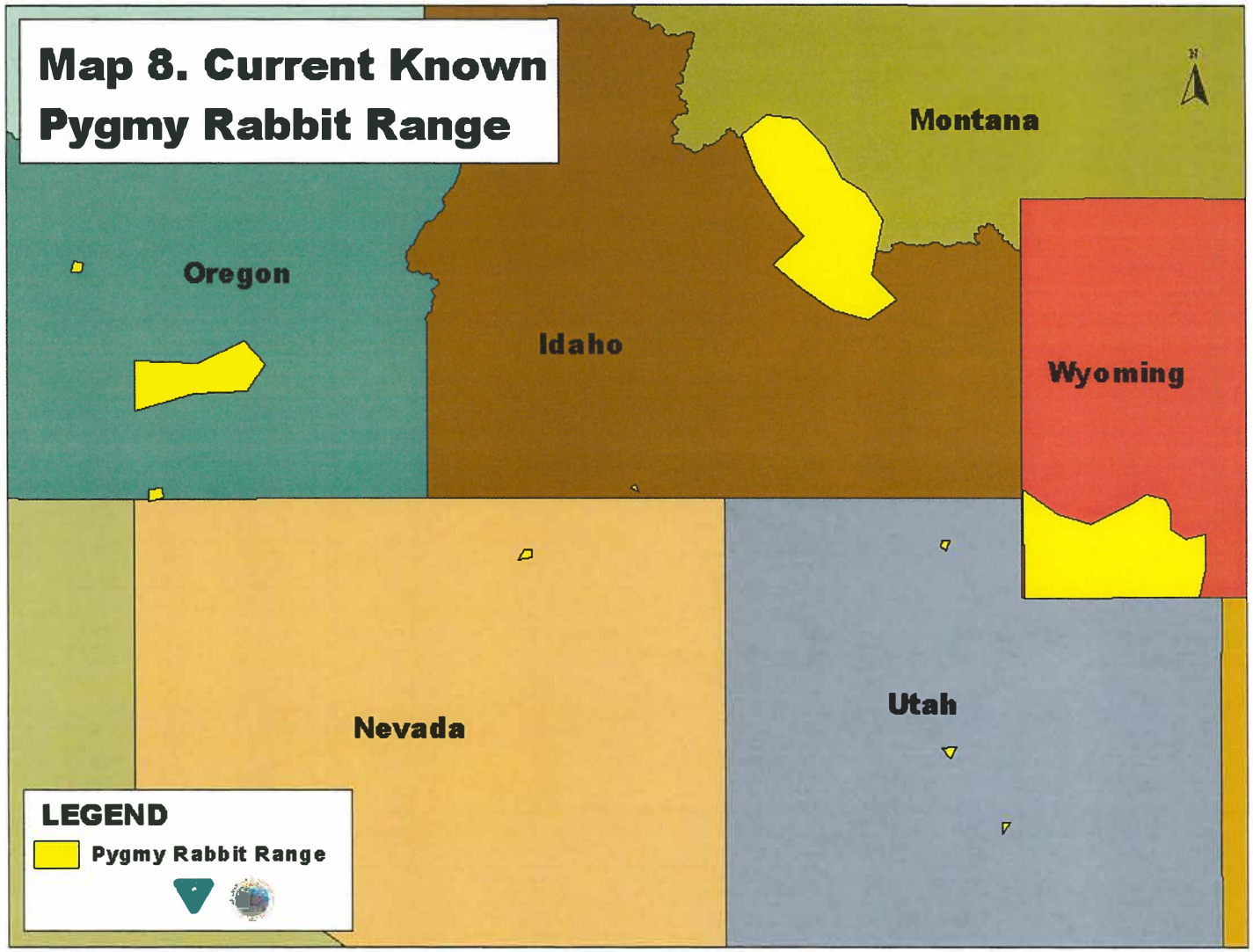
The Burley FOA plants after wildfires. However, the main objective of these seedings is to prevent soil erosion. These seedings are not planted to maintain or improve wildlife species. Typically, these seedings require thirty or more years to mature to provide suitable pygmy rabbit habitat.

General Pygmy Rabbit Ecology

Historically, the pygmy rabbit was found throughout much of the Great Basin as well as some of the adjacent intermountain areas (Green and Flinders 1980) (Map 7). The eastern boundary of this species range extends to southwestern Montana and southwestern Wyoming (Campbell et al. 1982). The southeastern boundary extends along the western edge of Utah (Janson 1946; Janson 2002; and Pritchett et al. 1987), Central Nevada (Nelson 1909) and northeastern California (Orr 1940) form the southern and western most boundaries of its range. The northern boundary of the main population historically reached to the southern foothills of the Blue Mountain Plateau (Bailey 1936) in eastern Oregon (Weiss and Verts 1984). The northernmost extent of this species range is Douglas County, Washington (Dobler 1992). This small population in Washington was considered disjunct from the Great Basin population. Historically, this species is thought to be extirpated from much of its former Washington state range and currently, all known individuals were trapped and placed in captivity at the Oregon Zoo or at Washington State University for breeding purposes (Cooke).

Current, known pygmy rabbit populations are thought to be limited to a few localities (Map 8). During the past few years, intensive surveys have been conducted throughout this species range (Dobler personal communication; Bartels and Quinn 1997, Bartels 2000 and 2002; Gahr 1993; Weiss and Verts 1984; Rauscher 1997; Tull personal communication, Garber 1986; and


Map 7. Historical
Pygmy Rabbit Range
Washington
Montana
Idaho
Oregon
Wyoming
Nevada
California
Utah
Colorado
Arizona
LEGEND
Pygmy Rabbit Range


Map 8. Current Known
Pygmy Rabbit Range
Montana
Oregon
Idaho
Wyoming
Nevada
Utah
LEGEND
Pygmy Rabbit Range

Ulmschneider personal communication). Based on these surveys, this species is only known to be found in portions of 17 counties within its former range including:

Larger pygmy rabbit populations are known from:

- Montana Beaverhead County
- Idaho Butte, Custer, and Lemhi Counties
- Wyoming Uinta, Lincoln, Sublette, and Sweetwater Counties
- Oregon Harney and Lake Counties

Only a few isolated pygmy rabbit burrow system locations and individuals are known from:

- Nevada Elko County
- Oregon Deschutes County
- Utah Rich, Sevier, and Wayne Counties
- Idaho Cassia and Twin Falls Counties

Habitat Requirements

The pygmy rabbit is primarily found in range sites with big sagebrush (*Artemisia tridentata*) and usually is found in dense, clumped stands (Orr 1940). Studies in different western states have compared shrub cover and density between pygmy rabbit burrow sites and non-burrow sites (Weiss and Verts 1984; Rauscher 1997; Gahr 1993; Green and Flinders 1980; and Gabler 1997). Our sagebrush canopy cover was higher as compared with other western states however, our sample size was low.

Soil Characteristics

Pygmy rabbits excavate their own burrow systems. Soil type is most likely a key habitat feature. Pygmy rabbits generally will select sites with deeper and looser soil than adjacent sites (Weiss and Verts 1984; Gabler 1997; Gahr 1993). Alluvial fans may provide the soil requirement in some cases (Orr 1940 and Green and Flinders 1980a).

Topography

Landform plays a part in a burrow selection site. Active burrows more frequently occur on mounds, intermounds, or dissected topography (Kehne 1991). This species uses a small rise, change in contour, drainage system, or slopes where soils are deposited by winds for a burrow entrance (Gabler 1997 and Gahr 1993).

Burrows

As pygmy rabbit individuals are often times difficult to observe due to the time of year that a survey is conducted and due to their secretive nature, burrows are often the key to finding pygmy rabbit populations. Pygmy rabbits typically burrow under big sagebrush (Wilde 1978). In addition, they utilize abandoned yellow-bellied marmot burrows, as well as natural cavities, rock piles and abandoned buildings (Green 1978 and 1980; Wilde 1978; Dobler personal communication). Pygmy rabbit burrow systems may have from one up to ten entrances (Janson 1940; Gahr 1993; Wilde 1978; and Green and Flinders 1980). Many small pellets (5-9mm) are typically located at the entrances of these burrow systems.

Recent information from pygmy rabbit captive populations indicate that the female digs natal burrows with only one entrance and may birth and nurse their young at the ground surface in a small depression near the burrow's entrance. They may also construct "dead end" burrows within a "community" burrow to birth their young (Oregon Zoo personal communication). These "dead end" burrows may also be constructed by desert cottontails (*Sylvilagus audubonii*) as natal burrows.

Home Ranges

Pygmy rabbits have small home ranges. During the winter they remain within 30 meters of their burrow (Orr 1940; Janson 1946; Gahr 1993; Katzner and Parker 1997). Subnivian burrows may also be utilized during winters where deep snow may occur (Rauscher 1997). Typically, males and females are thought to inhabit the same burrow systems or nearby burrow systems during the winter. It is thought that male and female home ranges are similar during the winter. However, during the spring and summer, home ranges increase. Females and males may have differing size home ranges due their reproductive behavior. Females can range from 2.7 hectares while males may range up to 20.2 hectares (Gahr 1993). Dispersal from burrows can be up to 2.17 miles (Green and Flinders 1979; Katzner and Parker 1997).

Diet

Sagebrush is the major food of the pygmy rabbit. Rabbits were observed feeding 82 times and food items were identified in 53 instances and include: 39% shrubs, 45% grasses, and 23% forbs (Gahr 1993). Generally, the rabbits ate forbs from April through June, and predominantly grasses from April - August (Gahr 1993). In Washington, recent data indicates that pygmy rabbits by random chance ate more grasses and forbs in ungrazed areas, as compared with grazed areas (Shipley personal communication).

In Idaho, sagebrush comprised 99% of the winter diet of pygmy rabbits (Green 1979). In addition, green rabbit brush was another significant food item (Green 1979). During the spring and summer months, the diet consisted of 39% grasses and 10% forbs, with the majority of the diet still consisting of sagebrush (Green 1979).

Field Sign

The pygmy rabbit is the smallest North American rabbit species (Orr 1940 and Dobler and Dixon 1990). This species is between 375-435 g for adult males and 246-458 g for females (Orr 1940; Janson 1946; Wilde 1978; and Verts and Carraway 1998). This species is often described as gray in color with a buff colored abdomen, and the legs, chest, and nape are cinnamon buff (Dobler and Dixon 1990). However, pelage colors may change during and after the molt and in different localities. The tail is small 15-20mm for males and 15-24mm for females (Dobler and Dixon 1990). In addition, the paws and abdomen generally have curly, longer buff colored fur and the internal edges of the ears are buff colored (Dobler personal communication). Based on multiple museum specimens viewed by the author, the prone portion of the back legs are white for cottontail rabbits, but are golden colored for pygmy rabbits.

The author has found that typically, museum specimens may appear very similar to immature cottontails (*Sylvilagus* spp.). However, the best field mark for pygmy rabbits is "no white tail". But, this field mark must be evaluated carefully when there are no burrows or other sign to co-berate an observation. In addition, a biologist must be careful about stating that he/she observed a pygmy rabbit based on lack of a white tail because immature black tail jackrabbits, which can be found in similar habitat, also have no white tail and when young and may be of a similar size. Without typical pygmy rabbit burrows and sign, only a photo should be used to positively identify this species in the field. Due to the very low number of individuals and populations known to exist in the western US and Idaho, trapping to determine identification is not recommended.

Population Biology

Mortality rates may be as high as 88 percent in adults and over 50 percent of juveniles may die within approximately five weeks of their emergence (Wilde 1978). Mortality rates can be expected to vary between years due to weather and predators. Natural population cycling could also be a factor in low populations, but this has not been studied in pygmy rabbits.
Pygmy rabbits are usually thought to be crepuscular (Bradfield 1974) although other authors state that they have observed them nocturnally (Janson 1940). This species typically evades predators by maneuvering under the dense sage or by escaping into their burrows (Bailey 1936). Unlike jackrabbits and cottontails,

this species does not hibernate during the winter, so individuals and their sign can be more readily identified during the winter.

Disturbances

This following discussion is not intended to be comprehensive regarding threats to pygmy rabbits. Common disturbances that exist for pygmy rabbits include: (1) removal of sagebrush, (2) fragmentation of sage habitat by agricultural use or other land uses, (3) wildfire or prescription fires and seedings dominated by crested wheat, (4) overstocking of livestock, (5) floods, and (6) sagebrush disease. Other disturbances that will not be discussed in this report include: (1) disease, (2) increased human disturbance, and (3) new roads and fragmentation from those roads. These threats should be carefully reviewed when evaluating proposals on BLM public lands within dense sagebrush cover, known pygmy rabbit habitat or populations, and historical sites.

Agriculture

The primary disturbance on documented historical locations was due to agriculture. The removal of sagebrush and the fragmentation of the habitat north and south of the Snake River may have lead to the demise of this species in south-central Idaho. In addition, prior to dam construction to improve agricultural development, the Snake River historically became dry in the eastern section of Idaho. This prevented the current fragmentation of the Idaho sagebrush habitat on the north and south side of the Snake River.

Wildfire

The most severe and immediate threat to populations of pygmy rabbits is wildfire or prescribed fire when site-specific data has not been collected. Historically, range fire intervals may have occurred 50-100 years on the Snake River Plain (Whisenant 1990). However, current fire intervals have decreased and may currently be from 3-5 year intervals (Whisenant 1990). Bartels (2000) found that the 16 historical pygmy rabbit sites found by Weiss and Verts (1984) and three of the four known sites on Oregon BLM public lands were recently destroyed by wildfire. In Washington, a 2000 wildfire destroyed one of the two remaining pygmy rabbit sites (Musser).

The Idaho Nuclear Technology and Engineering Center (INEEL) pygmy rabbit population was affected severely by the 1990s wildfire and although there are some individuals remaining within this population. This population has not yet recovered and is not expected to recover for several decades. In addition, this area will not provide suitable pygmy rabbit habitat for another 20-30 years. After

the removal of pygmy rabbit habitat along the Snake River Plain at the turn of the century, the northern section of Idaho from Jerome to Idaho Falls became the prime pygmy rabbit habitat within Idaho. This area has been recently burned, reseeded in crested wheat grass, and has been susceptible to noxious weed invasion. It is also not expected to recover for another 20-30 years. In addition, this area does not have populations adjacent to it to provide re-colonization of this species.

Grazing

Pygmy rabbits have evolved in the presence of ungulate grazing. During the 100,000 plus years that pygmy rabbits have inhabited the Great Basin, mule deer, elk, bison, antelope, and big horned sheep, all grazing species, have been present. The influence of cattle grazing on pygmy rabbit habitat is not well understood. However, there have been no long term studies specifically designed to determine the influence of grazing or grazing management strategies on pygmy rabbit habitat or population conditions.

In general, grazing is known to have an effect on pygmy rabbit habitat attributes depending on a variety of factors including timing, intensity of grazing, stocking densities, and locations of water or salt. However, grazing is also known to increase sagebrush cover (Ellison 1960; Daubenmire 1970; Tisdale and Hironaka 1981; Stevens 1984) and in other situations intensive overgrazing can break down sagebrush cover and thus make habitat unsuitable for pygmy rabbits (Daubenmire 1970). Green (1978) speculated that the preference of cattle for grasses might result in competition during the spring and summer when pygmy rabbits preferentially select grasses. However, pygmy rabbit preference for grasses during the spring may differ by region (Green 1978; Gahr 1993; and Rauscher 1997). Overstocking is a problem for pygmy rabbits because it leads to cattle breaking or destroying dense clumps of sagebrush (Daubenmire 1970). For additional and more recent data regarding some research on grazing and pygmy rabbits see: (Gahr 1993; Rauscher 1997; USF&WS proposed rules for Washington Pygmy rabbits 2002; and Simons 2002).

Floods

Floods can be “gully washers” in shrub steppe habitats. In a Washington study, one pygmy rabbit returned to its burrow when a large flood occurred on the Washington site (Dobler personal communication). Uncontrolled floods were a major reason for the loss of individuals on the Sagebrush Flat site in Washington in 1996-97.

Sagebrush Disease

Numerous diseases affect sagebrush within the Columbia Basin and the Great Basin including various forms of "snow molds", moths, and galls. In Washington, the Sagebrush Flat pygmy rabbit population declined precipitously during the winter of 1996-97. The author believes that the decline was related to a snow mold on the sagebrush leaves. The Wenatchee Forest Research Station was unable to identify this particular "snow mold". Snow mold occurs in particularly wet seasons, such as that experienced during the winter of 1996-97. The secondary author observed 25 occupied pygmy rabbit burrows during the winter. By the spring, these 25 burrows became inactive and only 3 occupied burrows remained.

CONCLUSIONS

The majority of the grazing allotments that were foot searched were composed of some portion of re-seeding after wildfires, typically with crested wheat grass. Native vegetation is suitable for pygmy rabbits while crested wheat grass seedings are not.

We found only 6 active pygmy rabbit burrow systems within two grazing allotments on the Burley FOA, Mule Creek and Horse Creek Allotments in the Shoshone Basin. We found 16 inactive pygmy rabbit burrow systems within two grazing allotments in the Raft River Valley area, Dry Creek and Strevell allotments. These will continue to be monitored bi-annually for signs of activity.

We believe that our wildlife survey technical design was adequate and our findings represent this species status within these eleven allotments. We believe that the low population and abundance of pygmy rabbits that was found during this survey represents their status within the Burley FOA. While historically, this species was severely affected by the removal of sagebrush to agriculture, this species current low abundance and population is most likely due to recent wildfires and a slow habitat restoration process.

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